FRD ACTIVITIES REPORT
June 2007

Research Programs

Urban Dispersion Program

The manuscript "Atmospheric Flow Decoupling and its Effects on Urban Plume Dispersion" was submitted to the journal Boundary Layer Meteorology. Some concentration fluctuation data analysis (e.g. peak-to-mean ratio) was removed from this paper to sharpen its focus and to meet length requirements. Research is in progress on probability density functions for the real-time tracer concentration data from JU03. This will be combined in a new manuscript with the concentration fluctuation data analysis that was removed from the original manuscript. (Dennis Finn, 208-526-0566)

The manuscript "Plume Dispersion Anomalies in a Nocturnal Urban Boundary Layer in Complex Terrain" was submitted for ARL review. (Dennis Finn, 208-526-0566)

Perfluorocarbon Tracer Analysis Development

Additional tests were conducted to evaluate the possibility for contamination of tubing and pumps in the programmable integrating bag samplers when exposed to high perfluorocarbon concentrations. The test data suggested that a low level of contamination was present in subsequent samples after exposure to high concentrations. The artifact appeared to be ephemeral but an additional test will need to be conducted to confirm this and develop a protocol for dealing with this situation.

The 250, 4000, and 100,000 pptv sample stability tests continued. These tests have been in progress for 5 months now and the data indicate that sample deterioration is minimal. There was a brief comment last month about a small peak on the tail of the PDCB peak that was beginning to show up in some chromatograms and complicate correct peak integration. The origin and an understanding of this anomaly were recently determined. We are evaluating ways to deal with this but at least for the present the consequences are that this introduces a bias into the measurement of PDCB and increases the detection limit. A reliable and accurate PDCB peak integration is presently possible but it entails a much longer run time (about 10 versus 3 minutes). (Dennis Finn, 208-526-0566, and Roger Carter)

Cooperative Research with DOE NE-ID (Idaho National Laboratory)

NOAA INL Weather Center Web Page

The new NOAA INL Weather Center web page has gone live with a hot link on our home page and distribution notices sent to the Idaho National Laboratory employees. So far we have

received some positive comments from the INL emergency managers. The new page will continue to undergo improvements and updates over the next few months. One new recent addition included a separate RSS feed containing the NWS Fire Weather Watches and Warnings. With the fire season well under way across SE Idaho, this second RSS feed will display within minutes of any NWS fire weather warning issued across the INL. (Brad Reese, 208-526-5707, Jason Rich, Neil Hukari, and Kirk Clawson)

Emergency Operations Center (EOC)

On June 12, 2007, the INL Emergency Operations Center (EOC) was activated to respond to a fire in a chemical fume hood. FRD personnel were called into the EOC to provide meteorological and dispersion modeling support to the EOC planning team for approximately four hours. Two FRD employees also attended a "Lessons Learned" session at the WCB main conference room on June 14 to participate in discussions regarding improved EOC response to emergencies. (Neil Hukari, 208-526-0503, Roger Carter)

On June 5 and June 7, 2007, the INL emergency preparedness organization participated in four HSS Limited Scope Performance Drills conducted by DOE HQ. The drills were designed to test specific parts of the emergency response organization. FRD personnel participated in all four drills with Kirk Clawson and Dennis Finn participating with the EOC planning team for two drills on June 5 and Neil Hukari and Roger Carter participating on June 7. (Kirk Clawson, 208-526-2742, Neil Hukari, Dennis Finn, and Roger Carter)

Collaborative Research

A manuscript commenting on a recent paper published in *Boundary Layer Meteorology* has completed the internal FRD review process and will be shortly submitted for ARL review. The manuscript deals with the effects of time averaging on the value of the integral time scale. (Richard Eckman, 208-526-2740)

Transport and Dispersion Modeling

FRD received a request in June for the 2006 annual concentration estimates based on the MDIFF puff model. Each year these model runs are performed as part of the annual site environmental report. The runs use hourly data from the INL Mesonet to compute total integrated concentrations for the entire year. The 2006 runs are expected to be completed early in July. (Richard Eckman, 208-526-2740)

Discussions between FRD and other groups within NOAA, including other ARL divisions, have identified several upgrades or add-ons to the HYSPLIT dispersion model that would be generally beneficial. One of the most important is to upgrade the output graphics to make them more useful for decision makers. ARL Headquarters has already made substantial progress in this area. Other upgrades include adding a chemical database (via NOAA CAMEO) and improving radioactive dose calculations. All of these changes will be of direct benefit at INL when HYSPLIT eventually replaces MDIFF as the primary dispersion model. Another upgrade that primarily benefits FRD and SORD in Las Vegas is an option to derive a wind field directly from

mesonet observations. The current version of HYSPLIT gets its winds from forecast models such as those used by the National Weather Service. For EOC applications, this presents a serious problem, because the forecast model winds are sometimes not consistent with the current mesonet observations. Such discrepancies cannot be ignored in a real accident, so there must be some kind of "fallback" option based on direct wind observations. This wind-field option is of most benefit to organizations like FRD and SORD that maintain large mesonets. (Richard Eckman, 208-526-2740)

INL Wildfire Modeling

The WRF model output displayed on FRD's website now includes a simple fire hazard index for helping forecast periods of maximum wildfire danger. The index is directly proportional to wind speed and air temperature and is negatively related to the relative humidity. Through June the index seemed to provide reasonable forecasts of periods of high fire danger when the NWS issued red-flag watches or warnings. On a few days the index also correctly forecasted high fire dangers at INL even though there were no official warnings. The main reason for this was that the 4 km WRF simulations more accurately predict the peak afternoon wind speeds that are partly driven by orographic effects. One interesting pattern that seems to be emerging is that the early morning WRF runs (e.g., 0900 or 1200 UTC initialization) seem to forecast the highest afternoon fire hazards, whereas later runs (1500 or 1800 UTC) tend to reduce the hazard. (Richard Eckman, 208-526-2740)

Other Activities

Outreach

Kirk Clawson was invited to visit a local girls camp at Paris Springs Campground, ID, on June 28. He taught the girls, age 12 and 13, how to recognize various cloud types as part of their camp certification program. He also gave each girl a cloud chart from the National Weather Service.

Papers

Eckman, R.M., R.J. Dobosy, D.L. Auble, **T.W. Strong,** and **T.L. Crawford, 2007:** A pressure-sphere anemometer for measuring turbulence and fluxes in hurricanes, *Journal of Atmospheric and Oceanic Technology*. Volume 24, Issue 6. Pp. 994-1007.

Carter, R.G., N.F. Hukari, and J.D. Rich, 2007: Identifying Natural Clusters in Eastern Idaho Wind Fields: A Practical Application of Cluster Analysis to Wind Forecasting. *Weather and Forecasting*. (Returned from review)

Allwine, J., J. Heiser, J. Flaherty, T. Watson, **K. Clawson**, P. Kalb, K. Clark, 2007: Urban Dispersion Program and Opportunities for Emergency Preparedness, *2nd Annual NYC Interagency Workshop "Using Environmental Data during Emergencies: From Field Data Collection to Risk Communication"*, New York, NY. (In review)

Finn, D., K.L. Clawson, R.G. Carter, J.D. Rich, C. Biltoft, K.J. Allwine, J.E. Flaherty, and M.J. Leach, 2007: Analysis of Plume Dispersion, Decay, and Peak-to-Mean Excursions for Continuous Tracer Gas Releases in an Urban Core, Oklahoma City, JU2003. (Submitted to Boundary Layer Meteorology)

Finn, D., K.L. Clawson, R.G. Carter, J.D. Rich, K.J. Allwine, and J.E. Flaherty, 2007: Analysis of Plume Dispersion in a Nocturnal Urban Boundary Layer in Complex Terrain, Salt Lake City, URBAN 2000. (Submitted for ARL Review)

Safety

On June 25th, Rhonda Carpenter and Mark George from NOAA MASC Safety and Environmental Office completed an Assistance Site Survey. The inspection went very well with very few action items. They were very impressed with the cleanup of the grounds and surplusing of excess equipment. We should receive a final report from them in August.

Travel

Donna Harris traveled to Seattle, WA on 6-8 June to attend Reimbursable Training.

Training

Randy Johnson, Shane Beard, and Tom Strong viewed a Forklift DVD from the National Safety Compliance and are scheduled to have hands-on forklift training in July.

Personnel

The Performance Payout Report was submitted to Donna Gray at ARL Headquarters.